United States' Actions to Reduce the Threat of Ship Collisions With North Atlantic Right Whales

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Introduction

The North Atlantic right whale (*Eubalaena glacialis*) is one of the most critically endangered large whale species in the world. Collisions with ships are responsible for more right whale deaths and serious injuries than any other single human impact (Knowlton and Kraus, 2001), and ship strikes are considered the most significant threat to the recovery of the population (Waring et al., 2004; Kraus, et al., 2005; NMFS 2005).

Collisions between vessels and whales occur globally and affect all large whale species. A database compiled by the National Oceanic and Atmospheric Administration (NOAA) contains records of ship strikes worldwide involving eleven large whale species; records indicate that North Atlantic right whales are one of the most frequently hit species. The database contains 61 records of ship strikes worldwide involving right whales, 36 (59%) of which occurred in the waters off the U.S. Collisions with whales in the United States' waters are most common along the east coast, followed by the west coast and Alaska/Hawaii (Jensen and Silber, 2003; Bettridge and Silber, 2006). At least four known, and three probable, right whale deaths occurred as a result of ship strikes since early 2004 (Kraus et al., 2005; Bettridge and Silber, 2006).

Recognizing the severity of the problem of ship strikes affecting North Atlantic right whales, the International Whaling Commission adopted a resolution (Resolution 2000:8 on Western North Atlantic Right Whales) that arose from a 1998 special session of the Scientific Committee, which called "upon the United States and Canada to continue to pursue actively, practicable actions to reduce as far as possible ship strikes on right whales, in particular by using the information from the Mandatory Ship Reporting System to assess further mitigation steps, including adjustment of traffic." In addition, the resolution encouraged "the United States and Canada, as well as other countries whose ships transit through northern right whale habitat, to continue and expand educational programs to help mariners actively avoid collisions with right whales."

The U.S. has taken a number of steps to reduce the threat of ship strikes to right whales. Due to the gravity of the problem facing the North Atlantic right whale population, conservation efforts have been focused on this population over other species. Conservation actions include the use of aerial surveys to notify mariners of right whale sighting locations; establishing a right whale "500-yard no-approach" regulation for all ships and aircraft (U.S. Federal Register: 62 FR 41116, 13 February 1997); establishing Mandatory Ship Reporting systems to provide information to mariners entering right whale habitat (U.S. Federal Register: 64 FR 29229, 1 July1999); interagency collaboration with the U.S. Coast Guard (USCG) and Navy (USN); and consultations under Section 7 of the Endangered Species Act (ESA).

Despite these efforts, right whale mortalities continue as a result of collisions with vessels. Recently, NOAA developed a strategy to reduce the likelihood of ship strikes while minimizing the adverse impact on ship operations. In an attempt to make the Strategy as broad-based and effective as possible, it includes five basic elements:

(1) modifications to vessel operations such as routing and speed restrictions;
(2) continuation of established and ongoing research, conservation, education and outreach activities;
(3) expansion and implementation of mariner education and outreach programs;
(4) a review of vessel operations by government agencies and consultation regarding endangered species protection under ESA; and
(5) a bilateral right whale conservation agreement between the United States and Canada.

This paper provides a summary of ongoing and planned activities being undertaken in U.S. waters to reduce the threat of ship strikes to North Atlantic right whales. These activities primarily are those undertaken by NOAA, or by NOAA in conjunction with other agencies or organizations; additional ship strike conservation activities have been pursued by federal and state agencies, aquaria, academic groups and other non-governmental organizations. Nonetheless, the threat of ship strikes remains a serious one for the North Atlantic right whale population and the U.S. plans to monitor the effectiveness of its programs. If the threat is not reduced, additional, or more robust, steps need to be considered. The actions taken on behalf of this species may have conservation value in other settings and on behalf of other taxa, however, this has yet to be determined.

1. *Vessel operations*

Proposed Regulations

NOAA has prepared proposed regulations, in review by the Administration at the time of this writing, to regulate ships along the U.S. east coast. The proposed regulations focus primarily on limiting ship speed where relatively high right whale and ship

densities overlap near a number of U.S. east coast ports, at calving/nursery areas in waters off Georgia and Florida, and in New England waters. The proposed regulations are expected to be published for public comment by mid-2006, with final regulations expected by mid-2007. Actions being considered are described in an Advanced Notice of Proposed Rulemaking (ANPR), and in a Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement. Both the ANPR and NOI, and related information, can be obtained at: http://www.nmfs.noaa.gov/pr/shipstrike/ .

Although the precise speed of ships causing the majority of collisions is unknown, evidence suggests that the likelihood of death and serious injury to large whales struck by ships is related to ship speed (Laist et al., 2001; Jensen and Silber, 2003; Pace and Silber, 2005).

Ship Speed Advisories

As a result of various data sets and analyses providing support to the assertion that reduced ship speed will minimize the rate of serious injury and death (Laist et al., 2001; Jensen and Silber, 2003; Pace and Silber, 2005), NOAA decided to issue ship speed advisories (i.e., speed guidance of 12 knots or less) in areas and at times where right whales occur, particularly when right whales are known to be present. Therefore, since mid-2005, speed advisories have been provided to mariners through a number of media, including NOAA Weather Radio, the Mandatory Ship Reporting (MSR) systems (see description below) outgoing message (Fig. 1), National Weather Buoy websites, standard aircraft survey advisory e-mail messages and faxes, and are published in U.S. *Coast Pilots*, international *Notice to Mariners/Sailing Directions*, and *Admiralty Publications*.

Realigning the Traffic Separation Scheme Servicing Boston

The United States prepared and submitted to the International Maritime Organization (IMO) in April 2006, a proposal to reconfigure the "Traffic Separation Scheme" (TSS) that services Boston, Massachusetts. The proposed realignment -- involving only a 12 degree shift in the northern leg and narrowing the two traffic lanes by approximately ½ mile each (Fig. 2) -- is expected to provide a significant reduction in ship strike risk to right whales and all baleen whale species occurring in the area, with minimal concurrent impact to mariners using the TSS. NOAA estimates that the described changes in the TSS would result in a 58% reduction in the risk of ship strikes to right whales, and an 81% risk reduction in ship strikes of other large whale species occurring in the area. The IMO Subcommittee on Safety and Navigation will review the TSS proposal in July 2006, and forward it to the Maritime Safety Committee for review by late fall 2006. If the proposal is endorsed by the IMO, changes to the TSS could occur as soon as six months later, approximately June 2007.

Recommended Routes

The United States is considering establishing recommended shipping routes in key right whale aggregation areas: within Cape Cod Bay and the calving/nursery areas in

waters off Georgia and Florida. Positioning of the routes is based on MSR ship traffic data and years of right whale sighting data. They are an attempt to reduce the co-occurrence of whales and ships by minimizing ship transit times in whale habitat, avoiding specific whale aggregation areas, while also ensuring navigational safety and adverse effects on the shipping industry. NOAA is attempting to get the routes charted as quickly as possible. If routine use of the recommended routes is low (although it is not expected to be), NOAA will consider making the routes mandatory.

2. ***Continuation of ongoing conservation activities***

Aircraft Surveys – Right Whale Alerts

NOAA and other Federal and state agencies support or conduct extensive aircraft surveys for right whales. Surveys began on a regular basis in 1993 in waters off the U.S. southeast coast, and in 1997 in waters off New England. They are flown over northeast U.S. waters year round on virtually every day weather permits in major right whale aggregation areas. Surveys cover peak right whale abundance periods in Cape Cod Bay (principally between January and May) and in the Great South Channel (between March and July). Sighting information is also provided by USCG vessel operators, research and other ships operated by the NOAA, the Commonwealth of Massachusetts, and other sources. NOAA's National Marine Fisheries Service assembles the reports, and "alerts" are disseminated to mariners via an automated e-mail and facsimile system (Figs. 3 and 4), USCG Broadcast Notices to Mariners, broadcasts over NOAA Weather Radio, Army Corps of Engineers (USACE) Cape Cod Canal Traffic Controllers, and postings on several web pages. Shipping agents, pilots and port authorities disseminate the information to inbound and outbound shipping traffic. Further information on this program can be found at: http://rwhalesightings.nefsc.noaa.gov/.

In the southeastern United States, the survey program is a cooperative effort by the USN, USCG, USACE, and the States of Georgia and Florida. Sighting location information is gathered and disseminated by the USN through a number of media, including USCG Broadcast Notices to Mariners, NAVTEX (the USCG international communication system), NOAA Weather Buoys, and NOAA Weather Radio.

Mandatory Ship Reporting Systems (MSR)

The United States sought and received endorsement from the International Maritime Organization (IMO) to establish two Mandatory Ship Reporting (MSR) systems – one in waters off New England and another in calving/nursery areas in waters off Georgia and Florida. The systems, operational since July 1999, require that all ships 300 gross tons and greater report to a shore-based station via satellite communication systems upon entering these two key right whale aggregation areas. The U.S. northeast system operates year round; the U.S. southeast system is in effect from November 15 to April 15. Mariners are required to report ship name, call sign, entry location, destination, and ship speed. Reporting prompts an automated return message (Fig. 1) providing (a)

information about the vulnerability of right whales to ship strikes, (b) information about where the mariner can obtain guidance on reducing ship strikes, and (c) recent right whale sighting locations. A compilation of incoming reports also provides NOAA with a means to obtain information on ship traffic volume, routes, and speed to assist in identifying measures to reduce future ship strikes (Fig. 5) (Silber *et al*. 2002; Ward-Geiger *et al*., 2005). The program is jointly funded by the USCG and NOAA, and administered primarily by the USCG. Further information can be found at: http://www.nmfs.noaa.gov/pr/shipstrike/msr/.

Passive Acoustic Studies

One promising technique to detect whale presence is passive listening devices. The goal is to provide sighting locations to mariners entering the area where detections have occurred. Here, we provide only a cursory summary of passive acoustic technology activities and the capabilities. More complete discussions can be found elsewhere (see, for example, IFAW, 2006).

NOAA, in collaboration with academic scientists, has initiated several studies involving passive listening devices to assess right whale distribution with the goals of (a) better characterizing right whale distribution and occurrence, and (b) providing whale sighting locations to mariners. Temporary acoustic detection devices have been deployed at a number of locations along the U.S. eastern seaboard. For example, several directed projects have involved deploying listening devices in Cape Cod Bay and in waters off the U.S. mid-Atlantic states. In addition, collaborative efforts are underway to provide continuous, year round acoustic coverage of nearly all of the Stellwagen Bank National Marine Sanctuary off the coast of Massachusetts. Results, now being assessed, have generally been promising. Whale distribution data from these sources, when coupled with vessel traffic patterns from the MSR and other sources, will aid in the design of management measures.

Data on the temporary acoustic detection devices typically are stored and extracted upon retrieval, providing a retrospective look at the distribution of whale vocalizations. Advances in recent months have resulted in near-real-time capabilities, providing passive acoustic monitoring and tracking capabilities of right whale behavior and movements on a 24-hour basis.

3. ***Mariner and boater education and outreach programs***

Beginning a number of years ago, a number of organizations, including NOAA, developed education and outreach materials for mariners and boaters. Brochures, pamphlets, and videos were developed. Today, NOAA and the USCG distribute placards, brochures, and videos to mariners on ways to reduce ship strikes. Information is provided to pilots, trade associations and port meetings, during routine USCG boardings, and other means. NOAA also maintains two websites specifically devoted to

right whale ship strike reduction: http://www.nmfs.noaa.gov/pr/shipstrike/; and http://www.nero.noaa.gov/shipstrike/.

The *U.S. Coast Pilot* is a set of regionally-specific references on marine environmental conditions, navigation hazards, and regulations. Currently, captains of commercial vessels 1600 gross tons and above are required to carry the *Coast Pilot* when operating in U.S. waters. Since 1997, NOAA has provided updated information for U.S. eastern seaboard *Coast Pilot* guides, including information on the status of right whales, times and areas that they occur, threats posed by ships, the MSR, and advice on measures mariners can take to reduce the likelihood of hitting right whales. In 2005, NOAA began including ship speed advisories (to transit at 12 knots or less). Similarly, NOAA navigational charts are routinely updated as they are reprinted to include right whale advisories.

In addition, NOAA provides current information on right whales to National Imagery and Mapping Agency's (NIMA*) Notice to Mariners*. This publication, in addition to NIMA's *Sailing Directions*, provides guidance about North Atlantic right whales for mariners traveling in international waters. These publications are updated annually. Similar language has been provided to the United Kingdom's *Admiralty Publications*.

Holland America Cruise Line, working in conjunction with NOAA and others, has developed an interactive compact disc on reducing ship strikes that is now required for certification for all its captains and crew. Efforts are underway to distribute the CD to the entire cruise industry, and it may be available to users outside the cruise industry (e.g., the high-speed ferry industry).

There are records of relatively small craft striking and severely hurting whales. Therefore, signage has been developed and posted in various ports to notify recreational boaters about the vulnerability of right whales to ship strikes.

A number of entities in the United States are developing a more rigorous and comprehensive mariner and industry and recreational boater education and awareness program; some elements are being implemented, others developed.

4. ***Vessel operations conducted by government agencies***

Since U.S. government vessels account for a substantial number of ship transits each year through right whale habitat, it is important to bring their operations into any discussion of attempts to reduce ship strikes. Therefore, ship strike reduction efforts include consultations under Section 7(a) (2) of the ESA (required for any action authorized, funded, or carried out by any federal agency), to ensure that federal actions are not likely to jeopardize an endangered species or its critical habitat. As consultations are conducted, conservation steps will be identified and implemented.

A number of federal agencies have, over the years, entered into consultations, and as a result of prior consultations, have modified vessel operating procedures. The USCG provides protected species training for USCG personnel and posts lookouts when operating vessels in areas where right whales occur. The agency issues guidance to its vessel operators to proceed with caution and at the "safe speed" in the vicinity of right whales. The USCG participates in the Right Whale Early Warning System, and transmits broadcasts reporting right whale sightings and locations to mariners over NAVTEX. Furthermore, the USCG supports NOAA emergency efforts in responding to right whale strandings.

The USN has made efforts to limit interactions between its vessels and whales, which include issuing advisories to its fleets to "use extreme caution and use slow safe speed" when near right whales, limiting vessel transits through right whale habitat when not adversely affecting a vital mission, and posting trained marine mammal lookouts while operating in critical habitat or areas of concern. Operations in critical habitat or areas of concern are limited to daylight and periods of good visibility when possible. The USN participates in the Early Warning System, distributing right whale sighting information to the Department of Defense and civilian shipping industry. The USN also contributes funding toward the Early Warning System survey flights.

As a result of its numerous ESA consultations, USACE operators and contractors in waters off Georgia and Florida post trained whale lookouts and avoid nighttime transits. During periods of low light or limited visibility, USACE dredges are required to slow to 5 knots or less when operating in areas where whales have been sighted. In addition, NOAA requested that USACE Cape Cod Canal Traffic Controllers notify mariners using the Canal about right whales; as of March 2004, Controllers alert ships' masters of right whale locations when right whales are detected in areas where Canal traffic may transit.

In addition, in 2005, NOAA contacted all relevant Federal agencies and asked that vessels proceed at 12 knots or less when in right whale habitat. Most have voluntarily complied when vital missions are not compromised.

5. ***United States/Canada Bilateral Conservation Agreement***

North Atlantic right whale range is transnational. Therefore, similar right whale conservation challenges exist in both U.S. and Canadian waters. In this regard, NOAA intends, with the appropriate federal agency or agencies, to initiate the negotiation of a bilateral Conservation Agreement with Canada to ensure that, to the extent possible, protection measures are consistent across the border and as rigorous as possible in their protection of right whales. Although specific language of such an agreement has not been identified, discussion of an agreement is expected to take place in the coming months.

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Figure 1. Example of outgoing message transmitted automatically to ships reporting into the Mandatory Ship Reporting systems.

MANDATORY SHIP REPORTING SYSTEM

YOU ARE ENTERING NORTH ATLANTIC RIGHT WHALE HABITAT. THE SPECIES IS CRITICALLY ENDANGERED AND VULNERABLE TO BEING HIT BY SHIPS; WHALES MAY NOT AVOID SHIPS. COLLISIONS CAN DAMAGE VESSELS.

EXERCISE PRUDENT SEAMANSHIP AND ADVANCE PLANNING TO AVOID RIGHT WHALES. ASSUME ANY WHALE SIGHTED IS A RIGHT WHALE. MONITOR USCG BROADCAST NOTICE TO MARINERS, NAVTEX, AND NOAA WEATHER RADIO FOR LATEST ADVISORIES AND SIGHTINGS. CONSULT NAVTEX, INMARSAT C SAFETYNET, US COAST PILOTS, BRITISH ADMIRALTY PUBS AND NOTICES TO MARINERS FOR WAYS TO AVOID HITTING RIGHT WHALES AND APPLICABLE REGULATIONS. RIGHT WHALE CRITICAL HABITATS ARE MARKED ON RECENTLY UPDATED NOAA CHARTS. INFORMATIONAL PLACARDS, VIDEOS AND OTHER MATERIALS ARE AVAILABLE FROM AGENTS, PORT AUTHORITIES,PILOTS AND USCG.

REPORT ALL STRUCK, DEAD OR ENTANGLED WHALES IMMEDIATELY TO USCG ON VHF CHANNEL 16.

BE ADVISED THAT WHALES MAY NOT REMAIN AT REPORTED LOCATIONS. WHALES MAY ALSO OCCUR AT UNREPORTED LOCATIONS. WHALES SHOULD BE ANTICIPATED THROUGHOUT THE NORTHEAST U.S. CRITICAL HABITATS AND ADJACENT AREAS FROM JANUARY THROUGH JULY.

WHALES SIGHTED AT:

4203N 07008W

Figure 2. Distribution and density of baleen whale sightings (North Atlantic right whale sightings in white circles) relative to the existing and proposed Traffic Separation Scheme in the approach to Boston, Massachusetts, USA.

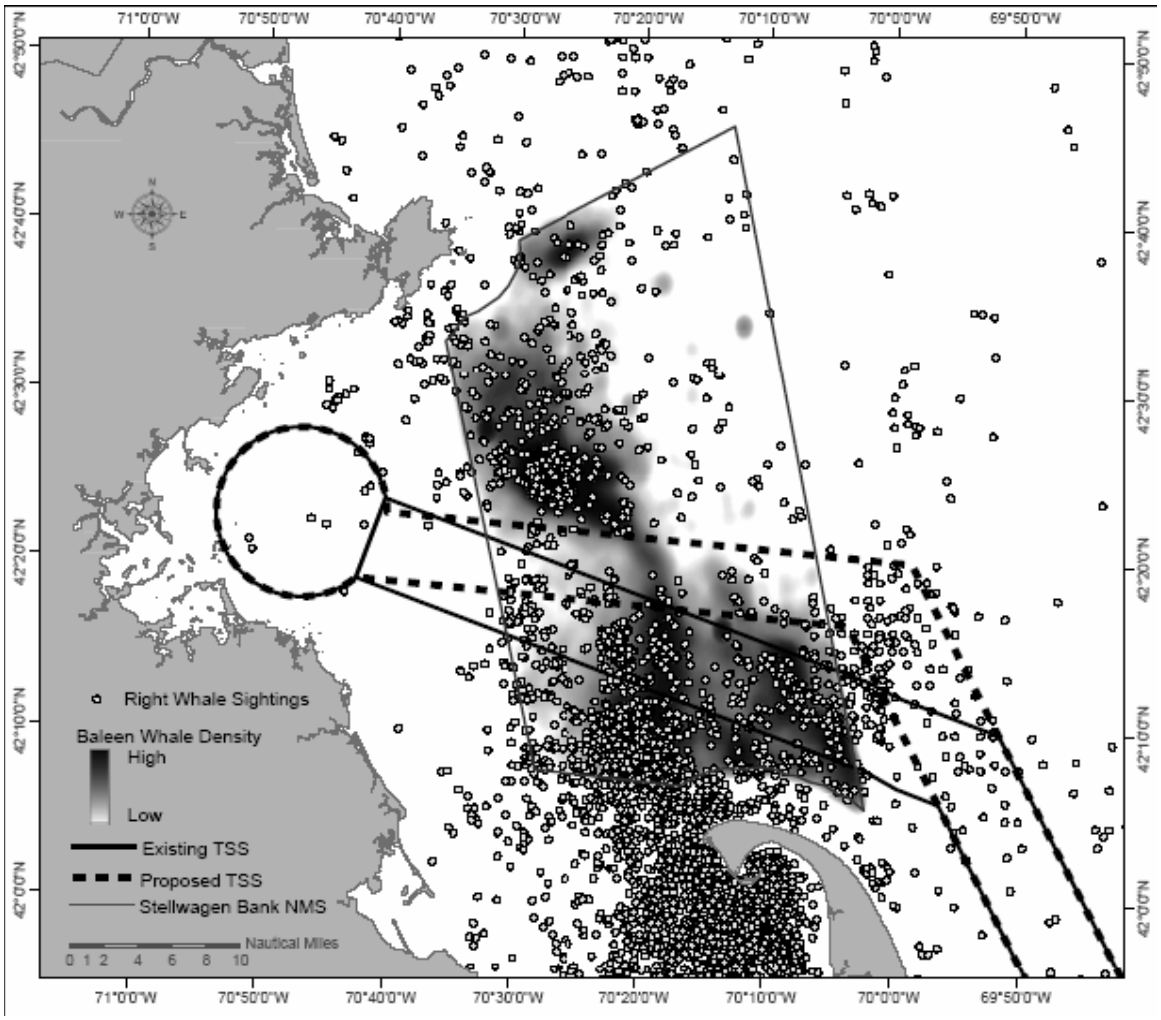

Figure 3. Example (11 April 2006) of daily North Atlantic right whale sighting "alerts" and ship speed advisories. The message is provided by e-mail, fax, NOAA Weather Radio broadcast, NAVTEX and USCG Broadcast Notice to Mariners.

ENDANGERED NORTH ATLANTIC RIGHT WHALE SIGHTINGS:

NEW SIGHTINGS:

7 sighted in the vicinity of the Boston shipping lanes, 45 nm southeast of Boston, MA in an 8 nm radius around position 42-14N 069-54W

1 sighted in the vicinity of the Boston shipping lanes, 40 nm southeast of Boston, MA in an 8 nm radius around position 42-07N 070-08W

1 sighted 160 nm southeast of Boston, MA in an 8 nm radius around position 41-29N 069-28W

6 sighted in the vicinity of the Boston shipping lanes, 80 nm southeast of Boston, MA in an 8 nm radius around position 41-33N 067-23W

PERSISTENT AGGREGATIONS:

3 sighted in the vicinity of the Boston shipping lanes, 30 nm southeast of Boston, MA in an 8 nm radius around position 42-05N 070-24W

10 sighted in the vicinity of the Boston shipping lanes, 50 nm southeast
of Boston, MA in an 8 nm radius around position 41-56N 069-57W

4 sighted in the vicinity of the Boston shipping lanes, 65 nm southeast of Boston, MA in an 8 nm radius around position 41-53N 069-42W

BE ADVISED THAT WHALES MAY NOT REMAIN AT REPORTED LOCATIONS. WHALES MAY ALSO OCCUR AT UNREPORTED LOCATIONS WITHIN AND ADJACENT TO IDENTIFIED CRITICAL HABITAT AREAS. VESSEL OPERATORS ARE REMINDED TO USE CAUTION AND PROCEED AT SAFE SPEEDS IN AREAS USED BY RIGHT WHALES. NOAA SUGGESTS SPEEDS BELOW 12 KNOTS WHEN CONSISTENT WITH SAFETY OF NAVIGATION. INTENTIONALLY APPROACHING WITHIN 500 YARDS OF RIGHT WHALES IS PROHIBITED AND IS A VIOLATION OF FEDERAL LAW. PLEASE REPORT ALL RIGHT WHALE SIGHTINGS TO 978-585-8473 OR TO THE COAST GUARD VIA CHANNEL 16. DETAILS OF SIGHTINGS CAN BE VIEWED AT
http://rwhalesightings.nefsc.noaa.gov/ or
http://whale.wheelock.edu/whalenet-stuff/reportsRW_NE/

Figure 4. Example (11 April 2006) of daily North Atlantic right whale sighting location advisories. The graphic is provided to mariners and others via a posting at http://rwhalesightings.nefsc.noaa.gov/, and are sent by facsimile to mariners and others. The number of right whales at each sighting location is shown within the circles.

Latest Right Whale Sightings

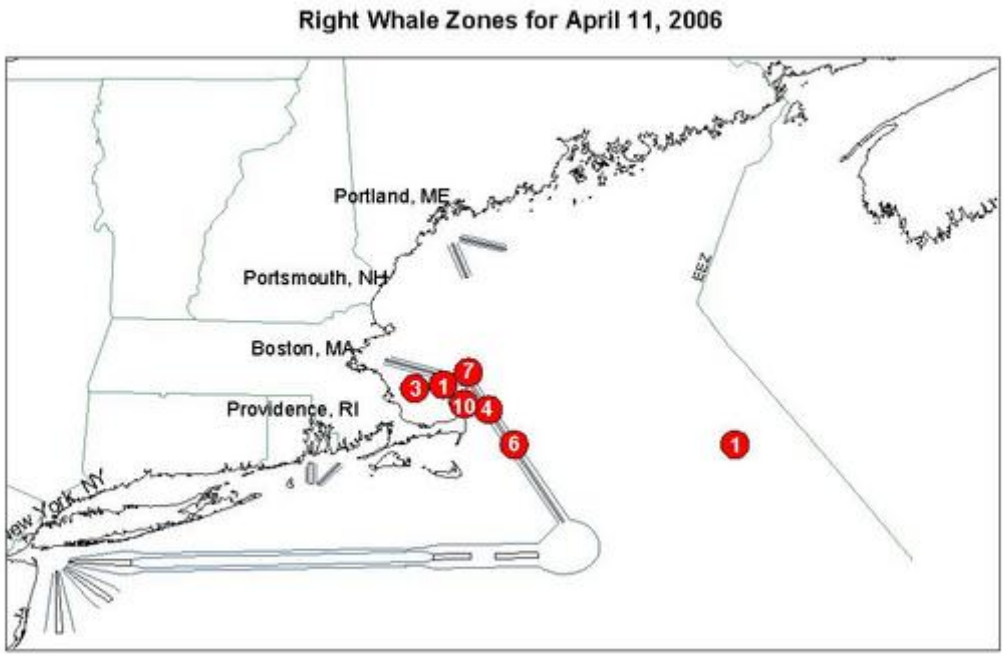

Figure 5. Ship traffic tracks and volume derived from Mandatory Ship Reporting systems incoming reports at two locations (a) New England waters, and (b) and waters off Georgia/Florida, along the U.S. east coast. (Ward-Geiger et al. 2005)